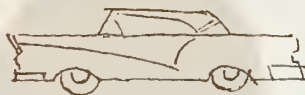
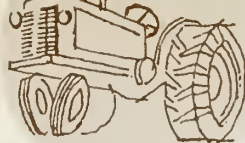


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# billions dollars

## for *FARM MECHANIZATION*

by Albert R. Kendall

OUR farm population offers a broad market for those who sell and service motor vehicles and machinery. Farm people in 1955 spent \$8 billion for the purchase, operation, and maintenance of mechanized equipment.

The major part of this 8-billion-dollar outlay went for the purchase of new or used cars, trucks, and farm machines. After deducting the value of trade-ins and sales, farmers paid nearly \$3.7 billion for motor vehicles and machinery.

They spent another \$4.4 billion to keep this equipment going. Fuel and lubricants required a total of \$2.4 billion; repair and maintenance costs ran to \$1.6 billion, and a lot of other lesser expenses like registration and license fees, insurance and so forth came to about \$400 million.

In all, the mechanization bill in 1955 averaged \$1,700 a farm. For farms with a sales volume of \$10,000 or more, it averaged \$4,400. Small farmers, however, with sales of less than \$1,200 (but substantial incomes from off-farm work) had mechanical costs slightly under \$800.

Three-fourths of this cost of mechanizing the small farm went for the family automobile and for trucks which farmers often buy for family as well as farm use. Expenditures for automobiles totaled nearly a third of the outlay for all farm vehicles and

machinery. It came to nearly \$2.6 billion.

About \$1.2 billion went for the purchase of cars, \$750 million for gas and oil, and \$409 million for repair and maintenance.

Of the nearly 4 million automobiles owned by farm-operator families on January 1, 1956, one-half were less than 6 years old. Only 11 percent were 1945 or earlier models.

More than two-fifths of the cars purchased in 1955 were bought second-hand at a cost of \$400 million. Auto dealers that year, however, received more than \$800 million from sales of new cars to farm families. On the average, farmers purchased about 38 percent of their automobiles new in 1955.

Once on the road, they bought 2.5 billion gallons of gas and drove their cars nearly 40 billion miles.

Farmers also provided a good market for motortrucks. As of January 1, 1956, half the farms in this country owned trucks of one sort or another.

Usually these were small pickup trucks with a capacity of under 1 ton. And about two-thirds of the time, they were purchased secondhand.

On the average, farmers had considerably older trucks than cars. Sixty percent of the farm trucks were over 5 years old; 19 percent older than 10 years.

Nonetheless, farmers spent about \$400 million in 1955 for the purchase of trucks. They bought 1.5 billion gallons of gasoline to drive these vehicles nearly 20 billion miles.

The largest single expenditure in the area of farm machinery was for tractors. About \$2.2 billion was spent on the purchase and upkeep of farm tractors.

Farmers paid nearly \$700 million for new and used tractors after allowance is made for trade-ins and sales.

Sixty-five percent of our Nation's farms that year had an average of 1.6 tractors. About a third of these had been manufactured less than 6 years before; 31 percent were more than 10 years old.

For other farm equipment—combines, other harvesting machines, tillers, planting and spreading machines—farmers spent \$2 billion. Seventy percent of this outlay went for purchases, 25 percent for maintenance and repair, and 5 percent for gas and oil.

Most of these farm machines were bought new. Farmers spent \$1.3 billion for new equipment in 1955; only \$330 million for used machinery.

Sixteen percent of this total went for combines, 28 percent for other harvesting machines, 18 percent for tillage machines and implements, and 11 percent for planting and spreading machines.

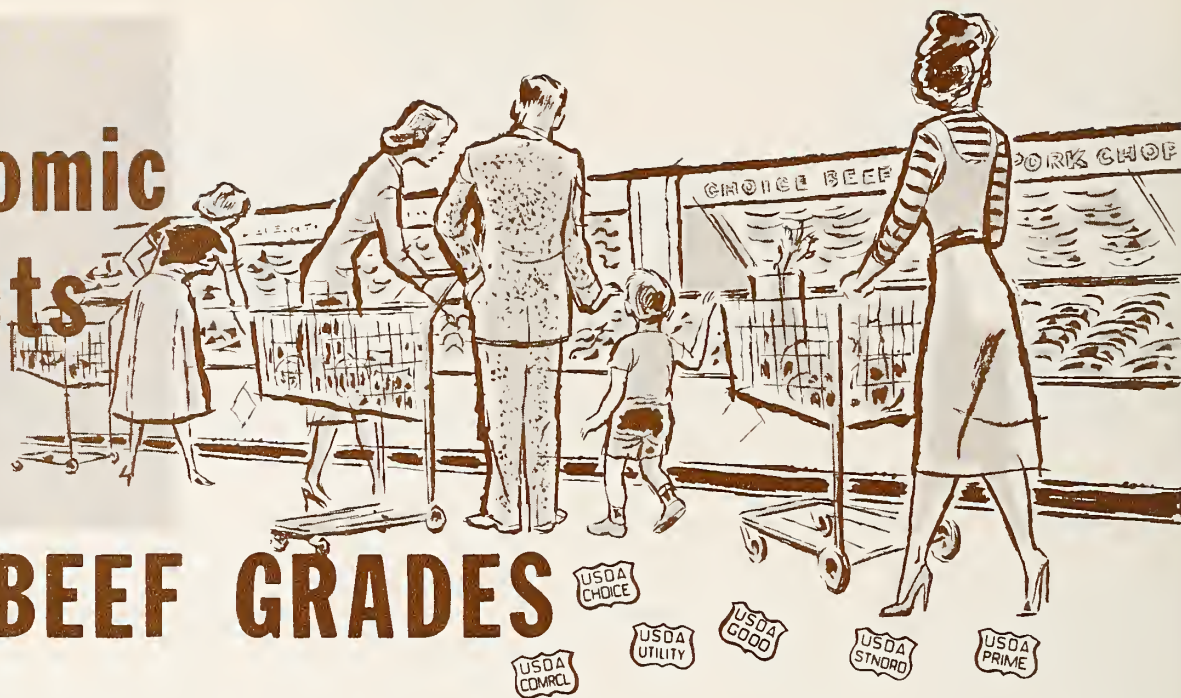
The complete story of mechanizing U.S. farms is told in Statistical Bulletin No. 243, "Farmers' Expenditures for Motor Vehicles and Machinery with Related Data, 1955," which will be issued some time this month by the Agricultural Marketing Service. Single copies may be obtained without charge.

The author is an analytical statistician with the Agricultural Economics Division, AMS.



# Economic Effects of

# U. S. BEEF GRADES



by Willard F. Williams

THE recent increase in the use of Federal grades for beef has brought about some notable shifts in the organization of the beef industry. The basis of competition in the industry has changed, and pricing and distribution of beef have improved visibly.

These are the two main conclusions of a recent AMS report on the economic effects of U.S. grades for beef. The report is based, in part, on a sample survey of national packers, independent packers, wholesale distributors, and chain and independent retailers of meat.

According to the study, most people in the beef industry seem to think Federal grades are helpful in the marketing of beef. They indicated that grades provide them with a useful tool in the pricing of live animals and meat. For retailers, grades serve as a convenient merchandising device as well as a guide for consumers. And producers find that grades make it easier to learn what the public wants and expects from them.

Attitudes and policies of the differ-

ent packing and wholesaling groups within the industry vary from the favorable to the unfavorable.

Most of the large packers prefer to sell beef under their own brands, and to supply federally graded meat only on request.

Chains, on the other hand, usually buy federally graded beef. Most other members of the marketing system favor U. S. graded beef in some form.

Large independent packers, who sell much of their beef to large-volume buyers in distant areas where production is low, are most consistently in favor of Federal grades. Small, local packers or those who operate in low meat-production areas tend to be less favorably inclined toward grades.

More than four-fifths of the wholesalers interviewed favor Federal grading of beef, and more than a third even say they would support a compulsory system of uniform grading.

Nearly all independent retailers approve of the present voluntary system of beef grading or a system of compulsory Federal grading.

Retailers prefer selling federally graded beef for several reasons. They say that use of Federal grades makes it possible for them to sell the same

quality beef month after month. Grades also save them time in dealing with suppliers. Also, grades eliminate much of the haggling over quality and thus cut down on buying costs. Lastly, buying and selling by grade allows retailers to increase the number, variety, and locations of their suppliers.

At all levels of the trade, Prime, Choice, and Good are the most widely used grades, with Choice the most popular.

Retailers say that the word "choice" is easy to sell. However, many chains were handling the present Choice grade quality prior to 1950 when it bore the name of Good. This is additional evidence that there is more to the present Choice grade than a name.

Choice beef seems to taste about as good to the consumer as Prime yet doesn't involve as much trimming loss. It is considered higher and less variable in quality than the current U.S. Good or Standard.

Finally, Choice beef usually is in plentiful supply throughout the year and can be aged satisfactorily.

The increased use of Federal grades for beef is, of course, closely tied to the growth of mass buying practices of the retail chain stores.

The author is Head of the Marketing Information and Statistics Section, Marketing Research Division, AMS. At the time of this research, he was with the Livestock Section of this Division.



As food chains have grown in number and in the volume of meat handled, they have turned more and more to specification buying and the use of Federal grades. Grades permit food chains to price and purchase meat by description from distant suppliers instead or by personal inspection. This expands the buying range of the chains and allows the purchase of more meat from a greater number of suppliers across a wider area.

As chain stores changed their buying habits, a number of changes also took place at the packer and wholesaler levels. The volume of slaughter tended to move from low beef-producing areas to areas of surplus production. And, the competitive positions of national packers and their branch sales houses, independent packers, wholesalers, and others in the beef industry began to change radically.

With Federal grades providing a uniform basis for buying and selling beef, many buyers found they could reach out to new sources of supply. Chain stores found that small-volume packers could supply Choice just as easily as large-volume companies.

Chains still buy large quantities of beef from national packers, but most of this is federally graded meat.

At the same time, Federal grades have made possible a general increase in the sales and size of independent packing companies. Since 1939, the volume of fresh beef handled by independent packers has risen substantially. Federal grades have broadened the market outlets of the local packer, whose meat—bearing the Federal grade mark—is now able to compete in any market in the Nation.

These developments have provided the independent packer with many new opportunities. He has now found that he can specialize his operations to some extent. In the past, it had been necessary for him to slaughter all species of livestock, to process a complete line of meats, and to deal with large numbers of small-volume buyers. With the opening of a national market, however, some local packers have begun to restrict their

operations to beef alone; others limit themselves to certain qualities of beef. A few have begun to concentrate on the particular weights and grades desired by retail chains.

This specialization among the packers has meant growth and further specialization for the wholesale distributors.

### Effect on Wholesalers

Wholesalers now handle types and quality of beef that packers cannot easily sell in carcass form to large-volume retailers. They specialize in breaking carcasses into wholesale cuts. In this way, they can provide chains and independent retailers with the extra chucks, plates, and other beef cuts they need and give jobbers who supply hotels and restaurants with the loins, rounds, and other cuts they require.

This type of specialization, which more precisely channels particular cuts of beef to the outlets where they can be used most advantageously, has been a very important factor in improving the efficiency of the beef marketing industry.

Although grading was only one of the influences leading to this, and other, changes in the beef industry, it has been a most important factor. With the growth of grading, however, a number of questions have come up.

For instance, do consumers buy Choice beef because retailers promote the grade, or do retailers promote Choice because consumers want it? The AMS research study indicates that the retailers, through their advertising and merchandising programs, are probably primarily responsible for the emphasis on Choice. In this, retailers seem to have been good judges of their customers' wants. For many customers, the U.S. Choice grade appears to provide the most satisfying compromise from among the available grades of fresh beef.

Another question that often arises is this: Have Federal grades tended to restrict bargaining opportunities of

the packers? No. They actually have increased the legitimate business opportunities of most packers. Packers and other suppliers can still bargain with buyers on each carcass of graded beef if they want to. They usually find, however, that it is less costly—and therefore more profitable—to sell on a volume basis at market prices established by weight and grade groupings.

Another question concerns the effect of Federal grades on the wholesale prices within and between each grade. Are these prices within grades narrowed to a single, arbitrary point, and consequently, are the differences in prices between grades too wide?

The study indicates that wholesale prices for beef of a certain grade vary widely at any particular time. But these price differences for weight, marbling, type of buyer, quality, and length of time the carcass has been held in the cooler are obscured by mass selling and the average prices quoted in the market news. Both public and private market reports, in effect, show more central tendency among prices than is actually true.

### Effect on Producers

And finally, what effect has the use of Federal carcass beef grades had on the producer? Although this is still a matter of some conjecture, it is clear that they have not been hurt by grading. Most producers appear to have gained substantially from the practice.

For one thing, the use of Federal grades may have helped to increase total consumption of beef. Also, by the use of a uniform grading system, producers can tell more accurately what the consumers want. In addition, grading has made it easier to establish prices.

Also, the costs of marketing probably have dropped as a result of the use of Federal grades which have made the beef industry more competitive and specialized.

Together, these changes have given the beef producer a somewhat stronger marketing position.



# Poultry Inspection

## Moves Ahead

by Hermon I. Miller

**I**N OPERATION since January 1, mandatory poultry inspection under the Poultry Products Inspection Act is rapidly becoming a routine part of poultry marketing. Staffs of inspectors have been assigned to all approved full-time slaughtering and eviscerating plants. These currently number 327.

The new law, designated by Congress as "an important consumer protection measure," requires inspection for wholesomeness of all poultry and poultry products processed in plants engaged in interstate commerce.

Administration of this law has been assigned to the Poultry Division of the Agricultural Marketing Service, which now has in its employ more than 1,200 highly trained poultry inspectors.

Some of these are experienced inspectors who previously worked under the voluntary poultry inspection program which USDA has operated for the past 30 years. But many others, both lay inspectors and veterinarians, are newly hired. These have had to be especially trained for their jobs.

As soon as the new inspection law was passed, a number of training schools were set up to instruct new inspectors and supervisors. Schooling was followed closely by on-the-job training in processing plants where new employees worked side-by-side with experienced inspectors. Advanced on-the-job training supplemented this program.

At the slaughtering and eviscerating plant, an inspector's job includes

lot-by-lot check-ups on the live poultry. If the inspector finds any indication of disease in a lot of poultry, he may then examine each live bird to make sure that it is healthy before it goes into the processing plant.

Inspectors in the plant examine each individual poultry carcass as it moves down the processing line to make sure that it is wholesome. They also check to see that plant operations meet the sanitation requirements of the law. Federal inspectors confirm the accuracy of labels on packaged poultry.

Although lay inspectors are trained to do some of the bird-by-bird inspection, they are closely supervised by veterinary inspectors. These inspectors-in-charge are in turn supervised by regional officials located at six key area offices in Philadelphia, Atlanta, Chicago, Dallas, Des Moines, and San Francisco. Also stationed in each of these offices are regulatory inspectors who are responsible for checking any infractions of the law.

Very few violations of the Act have been reported since it went into effect on January 1. The few that have been encountered have, in general, been the result of a misunderstanding of the exact requirements of the law or

have been what might be termed "technical" violations.

The poultry industry has cooperated wholeheartedly in the task of inaugurating the compulsory poultry inspection program.

Yet, because not all plants have been able to complete their remodeling requirements to date and because of the limited resources of the poultry inspection agency, the job of supplying inspection to all processing plants which may require it is not finished.

In order that the largest volume of poultry moving in interstate commerce could be inspected and all approved full-time eviscerating and slaughtering plants be staffed first, some exemptions of a practical nature had to be made during the transitional period.

These included canning and packaging plants as well as temporary exemption of part-time and seasonal operators. Temporary exemptions will be terminated as rapidly as funds and other limiting factors permit. By the end of March, it is anticipated that 367 full-time and 87 seasonal or part-time plants will have been approved and be operating under inspection.

If supplemental funds are made available, up to 111 more full-time and 36 more part-time plants could be brought into the program before July 1.

During 1960, any other plants which are or become subject to the law will be taken care of and the job of putting mandatory inspection into effect will have been completed.

### LIVESTOCK AND POULTRY INVENTORY, JANUARY 1

There were more beef cows, hogs, sheep, chickens, and turkeys on U. S. farms and ranches on January 1st of this year than a year ago. But the number of milk cows, horses, and mules at the beginning of this year was less than on the first day of 1958.

That's what the Crop Reporting Board of AMS found when they made their annual inventory of livestock and poultry.

The number of beef cows increased 5 percent, milk cows declined 3 percent. There were 12 percent more hogs. Total value of all livestock and poultry was estimated at \$18 billion—up 29 percent.

The author is the Director of the Poultry Division of AMS.



Commercial truck washing service does a big business each morning at the Chicago stockyard. It costs \$4.50 to wash livestock truck of this size.



This modern truck can hold 25,000 pounds of live animals. It is used to haul fed cattle to Chicago market from Iowa; usually returns empty.

# Transporting Livestock by Truck

by Victor B. Phillips

THE great cattle drives of the old West have not vanished from the American scene but rather have become a part of our Nation's huge livestock truckarama. Today, nearly all livestock is being driven from farm to market by motortrucks, a large number of which are "for hire" vehicles.

Since the cost of this truck transportation has a direct effect on the net return to the farmer and an indirect effect on the price the consumer pays for meat at the retail store, AMS economists have studied "for hire" trucking charges. Cost data for this investigation came from a special survey of 1955 farm expenditures. These figures were published in 1958 and are the latest available.

The study indicated that U. S. producers in 1955 paid an estimated \$87 million to move their livestock to market by motortruck. Transportation costs, however, varied considerably from area to area and from market to market.

Distance, the size of the farmer's shipment, the frequency and volume of return loads, and truck operational costs in the particular area—all play

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*Sheep and lambs consistently traveled the greatest distance to market. If they were moved to a terminal market, their average haul was 154 miles compared with 120 miles for cattle, 92 for calves, and 75 miles for hogs.*

*Sheep and lambs going to auction markets were shipped an average of 35 miles. This compared with 29 miles for cattle, 21 for calves, and 23 for hogs.*

*Even when sold to "local" dealers, sheep and lambs had the greatest distance to go. They then traveled 33 miles, whereas other livestock averaged less than 15 miles.*

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a part in determining the trucking bill.

The length of haul is, of course, the most important consideration in figuring transportation costs. Western producers, who, on an average, move their livestock 176 miles to a terminal market, pay more for transportation than producers in the Midwest, where the trip to terminals averages only 110 miles.

Even if these distances were equal, transportation charges would vary with the species marketed and the production region. For example, it costs more per head to transport cattle

than either hogs or sheep and lambs. And, certain parts of the country have higher trucking rates than others.

Hauling rates frequently depend upon whether or not a trucker can get a return load for his truck. If he can, his charges to the livestock producer will probably be much lower than otherwise.

Truckers also charge more per head for a partial rather than a full load, and mixed loads move at a higher rate than unmixed.

In addition, State licenses, load limits, taxes, and the like are reflected in the producer's transportation bill.

On the average, for the United States as a whole, 1955 truck transportation costs came to about \$3.38 a head for cattle moving to terminal markets. Calves cost \$1.43 a head; hogs traveled for 74 cents; and sheep averaged 96 cents.

For livestock moving to auction markets, per head costs averaged about \$1.51 for cattle, 87 cents for calves, 38 cents for both hogs and sheep and lambs.

A report on "Hired Truck Transportation in Marketing Livestock" has just been released by the Agricultural Marketing Service. Single copies of the study, MRR No. 297, may be obtained without charge from U. S. Department of Agriculture.

The author is a staff member of the Marketing Research Division of AMS.



# FLORIDA-GROWN POTATOES M

**W**INTER and early spring potatoes are big business in Florida. Annual production has been more than 7 million hundredweight in recent years. Farm value has run something like \$25 million.

The winter potato crop, produced in South Florida, is primarily red-skinned varieties and makes up roughly one-third of the State's total crop. The early spring crop, most of which is produced in the Hastings area, is largely of the Sebago variety. A considerable portion of this crop is used for chip manufacture.

About two-thirds of the Florida potatoes moving into marketing channels are inspected for grade by the Federal-State inspection service before shipment. In the event of unusual deterioration during shipment or to settle claims, some may be inspected again at terminal markets, while others are inspected there for the first time.

Directed by the Fruit and Vegetable Division of the Agricultural Marketing Service, the inspection service is entirely voluntary. Costs are borne by the applicant for the service.



As part of the inspection service, trained hands check potatoes. At the right

These potatoes were bagged in the field. Now they are being unloaded by hand onto conveyor belt which leads into plant.



Once in the plant, potatoes travel over mesh wire conveyor which permits soil to drop to the ground before spuds move into washing machine. In the washer, potatoes are rotated by rubber rollers under jets of water. Washed potatoes are then carried by escalators into another machine for drying. Potatoes in these pictures are Sebago's which are harvested, packed in early spring for table use and chip manufacture.



Trained hands reach out for defective potatoes as they leave the dryer. Potatoes are checked for any discoloration, cracks, cuts, bruises, shriveling, disease, sunburn, and





# E TO MARKET



Shipping point, licensed inspector uses sizing device for checking size of  
 puts into potato to check for discoloration, disease, and hollow heart.



AMS supervising inspector at right checks the grade interpretation,  
 size, and note sheet recordings made by licensed inspector.



fully  
 north.

This is overhead view of grading table. Workers in background pick out defective potatoes.  
 (Potatoes have previously been sorted for size.) Men at right attend bag filling stations.



Bagged and ready for shipment, potatoes  
 move by handtruck into refrigerator car.

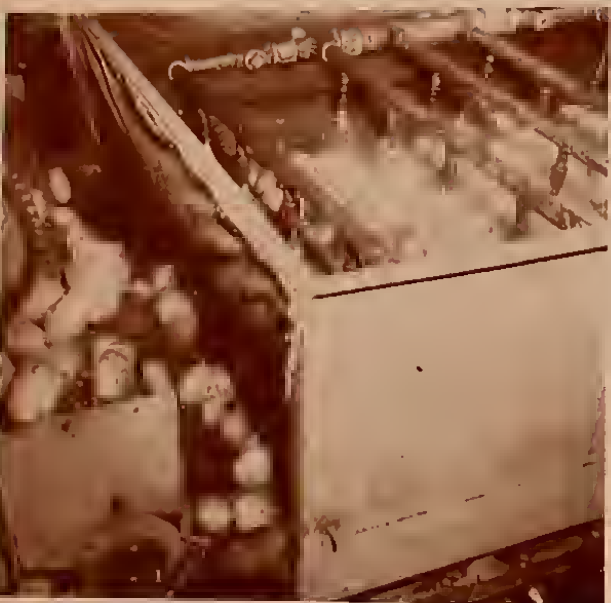








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As part of the inspection at shipping point, licensed inspector uses sizing device for checking size of potatoes. At the left, he cuts into potato to check for discoloration, disease, and hollow heart.



AMS supervising inspector at right checks the grade interpretation, size, and note sheet recordings made by licensed inspector.



Trained hands reach out for defective potatoes as they leave the dryer. Potatoes are carefully checked for any discoloration, cracks, cuts, bruises, shriveling, disease, sunburn, so forth.



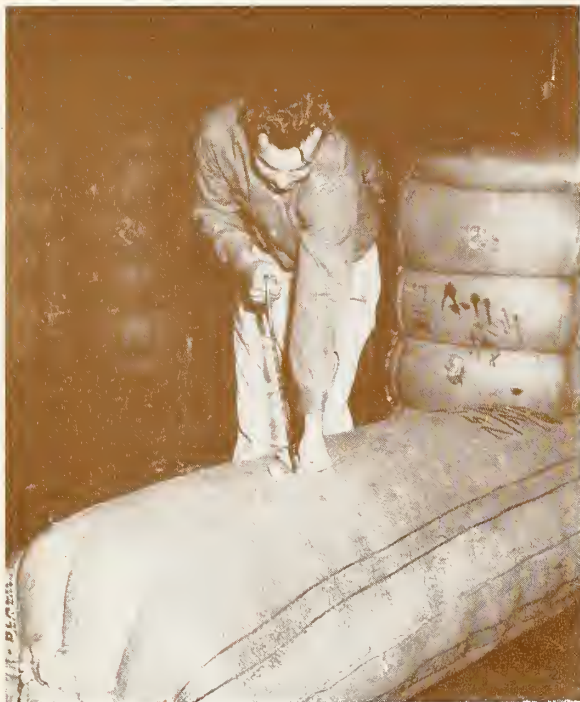
This is overhead view of grading table. Workers in background pick out defective potatoes. (Potatoes have previously been sorted for size.) Men at right attend bag filling stations.



Bagged and ready for shipment, potatoes move by handtruck into refrigerator car.







Fiber length is important consideration in determining value of wool. Here, AMS technician draws staple for length test.



This is the field set-up of portable wool testing laboratory. With this equipment, the fineness, staple length, clean yield, and color of raw wool can be determined.

A report on AMS laboratory work in

## ASSESSING QUALITY OF WOOL

by Elroy M. Pohle

**C**HANGES in marketing methods, improvements in textile machinery, and advances in fiber technology have stepped up the need for objective ways to describe the characteristics and properties of wool.

The Denver Wool Laboratory of the Agricultural Marketing Service's Livestock Division has, for many years, been studying more accurate and scientific methods for determining the qualities which affect the value and utility of wool.

Recently, the laboratory demonstrated how average fiber fineness of wool varies due to mechanical removal of certain fibers during the various stages of processing. From this, equations were developed which can be used to estimate the fineness of top produced from a given lot of raw

wool and, conversely, to determine the quality of raw wool needed to produce a top of a given fineness. (Top is wool which has gone through the processes of scouring, carding, and combing.)

In making this study, the laboratory received cooperation from both the trade and the American Society for Testing Materials, an organization composed of industry groups interested in developing standard methods of testing textiles and other industrial and commercial products.

The study, which was based on the processing of approximately 200 lots of wool, culminated in the development of specifications for average diameter and fineness distribution for raw wool grades. It also resulted in a proposal that the U. S. Standards for Grades of Wool be revised to incorporate these specifications. This proposal is still under consideration by the industry. Current official wool

grades are based on fineness or diameter as determined by visual comparison with physical samples representing each grade.

Since fineness is a primary indication of quality, many methods and techniques have been developed for measuring this property. The microprojector, involving microscopic image projections, is widely used at present, but work continues on other measurement methods.

Length of fiber is another important value-determining property of wool. Accordingly, the Department has suggested staple length standards for grades of grease wool. Formerly estimated by rule-of-thumb, the length of staple in raw wool may now be sampled and measured by objective means.

A new mechanical device for measuring fiber length, developed by the Wool Industries Research Associates, has recently been tested by the United

The author is Head of the AMS Livestock Division's Wool Laboratory in Denver.



States Department of Agriculture wool laboratory in Denver, Colo.

In a report on this project ("Application of the W.I.R.A. Fiber Length Measuring Machine for Wool," AMS 285), the laboratory states that while the machine seemed better suited to measuring wool fibers from card and top slivers, it probably could be adapted to measure fibers from grease wool staples.

Also under study by both the industry and the Department are other properties important to the quality of wool. These include color, moisture, strength, staple crimp, and presence of vegetable matter and colored and kemp fibers.

Until recently, many of the tests used were applied only to wool top. Work now has been directed toward making them applicable to wool during the whole range of processing, from the raw material to the finished product. Segments of the wool growing and marketing industries have sought means of applying some of the technological advances to wools still in the hands of the producer and the handler.

As a result, the Livestock Division's wool laboratory at Denver has been asked to conduct testing and sampling studies at a number of wool cooperative warehouses. In this series of tests, the laboratory staff is using modified lab procedures to demonstrate the application of proposed standards. At the same time, it is gathering information on staple length, fineness, yield, color, and so forth to be used in developing standard type descriptions.

If this project proves successful in adapting laboratory procedures for use in the field, it would lead to a marked improvement in the marketing of wools in this country.

Furthermore, as the grower's knowledge of the properties and characteristics of his commodity increases, he will be able to adjust his breeding program and practices more intelligently and thus more effectively meet the requirements and preferences of the manufacturers.

## Storage Behavior of Desert-Grown Lemons

Recent sizeable increases in plantings of lemons in the desert areas of Arizona and California have led scientists of the Agricultural Marketing Service to check and chart exactly how these lemons respond to commercial storage conditions.

Here's what they found.

Desert-grown lemons lose weight at the rate of about 2 or 3 percent a month when held at 58° to 60° F. and at 89 to 91 percent relative humidity.

About 45 percent of the total weight of these lemons is in the rind. After 1 month's storage, this decreases to about 40 percent. Later decreases are small.

Desert lemons give more juice per pound after 2 months' storage than when they are first picked.

Most of the fruit changes from green to pale yellow in the first month of storage. After 3 months, they are bright yellow. At this time, some bronzing is noticeable; this becomes prominent after 4 or 5 months.

Softening also occurs when the storage period is extended beyond 3 months.

Acid concentration in the Eureka and Lisbon varieties decreases slowly after the first month. Also, tree-ripened lemons give less acid per ton than lemons picked while still green in color.

Ascorbic acid concentration remains nearly constant throughout the storage period.

Darkening of the buttons is erratic and cannot be closely related to fruit decay.

Decay, however, was low in all test lots picked at the dark green stage (except Villafrancas grown from trees on rough lemon rootstock). Thirty-one of the 40 boxes examined contained no decayed fruit. Decay exceeded 1 percent in only 2 of the 40 boxes.

For the most part, the percentage of decay was related to color at harvest, but it was always far below that of tree-ripened fruit.

A complete account of the AMS storage tests will be released some time this month. Entitled "Storage Behavior of Lemons from the Desert Areas of Arizona and California," the publication may be obtained from the Office of Information, U. S. Department of Agriculture, Washington 25, D. C.

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## Pre-cooling Cranberries Improves Market Quality

Precooling cranberries before shipment to market gives added life to cartoned fruit during warm weather. It reduces the amount of decay both during transit and during the subsequent marketing period.

Tests made by Agricultural Marketing Service scientists showed that cranberries could easily be held at 40° to 45° F. in transit if they were precooled before shipment. At trip's end, there was only half as much decay in these berries than in similar shipments of nonprecooled fruit.

Freshly harvested and precooled cranberries also were much less susceptible to decay than fruit that had been stored 3 to 4 weeks.

A full report of the AMS tests may be obtained from the Office of Information, U. S. Department of Agriculture, Washington 25, D. C.





The AMS Savannah Stored-Product Insects Laboratory is constantly testing new types of insecticides for possible treatment of packaged food.



Chemical treatments of paper bags help keep insects out. Here is what happened to treated, untreated bags stored for 1 year in infested room.

## Improved Packaging Can Cut Insect Infestation

by Hamilton Laudani, Dean F. Davis, and George R. Swank

**T**HE RESISTANCE of a package to insect entrance is only as strong as its weakest point.

And, according to Agricultural Marketing Service entomologists, present-day packages have a lot of weaknesses. Some packaging materials offer little resistance to penetrating insects. Certain types of containers are not constructed tight enough to withstand insect attack.

The Savannah Laboratory of the Biological Sciences Branch of AMS for the past 8 years has been actively engaged in research on the development of insect-resistant packages. They have tested textile and paper bags, transparent films, laminated foils, and fiberboard containers. They also studied the effect of chemical treatments on each of these.

### Textile Bags

Textile bags, obviously, offer the least protection against insects. Burlap is especially bad because of its loose weave. In all storage tests conducted at Savannah, commodities

stored in burlap bags became infested with insects almost immediately.

Cotton sheeting, which has a closer weave than burlap, provides somewhat more resistance to nonpenetrating insects. But still, it is just a matter of time until these insects gain entrance through the open ends of the closures. Penetrating insects have no trouble at all getting into cotton bags. After a 3-month test period, flour in untreated cotton bags was found heavily infested with both penetrating and nonpenetrating insects.

Rayon bags are no more insect-proof than cotton ones. The penetrating species of stored-product insects go through rayon bags very easily, and the nonpenetrating species find their way into the bags through the seams and end closures. Rayon is also susceptible to roach damage.

Chemical treatment of textile bags for processed foods is not feasible with the materials available today because of the danger of contamination.

### Paper Containers

Paper packages will exclude nonpenetrating insects and offer a limited amount of resistance to the less effec-

tive penetrating species. Resistance, however, depends on the weight of the paper and the number of plies used.

The saw-toothed grain beetle can readily penetrate a single sheet of 15-pound paper, but very seldom makes its way through more than one ply of 50-pound kraft. Other insects, like the cadelle and lesser grain borer, have no trouble penetrating 50-pound kraft, laminated aluminum foil, laminated asphalt paper, or any of the other materials used in small and large paper containers. It merely takes these insects a little longer to bore through some materials than others.

Most of the insects that are found in paper containers have gained entrance through existing openings. Somehow insects seem to have a natural instinct for locating a break in a package. They usually find these along the lateral glued joints and the end closures.

The most effective type of closure—and one frequently used on multi-wall bags of 50- and 100-pound size—is the tape-over-stitching type. The open end is eliminated, and the stitching holes are covered. In one of the AMS tests, five times more beetles

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were present in bags having exposed needle punctures than in identical bags with tape over the stitching.

Chemical treatments enhance the natural resistance of paper and greatly increase the protection afforded by a well constructed package.

Pyrethrum in combination with piperonyl butoxide has been found effective in preventing insect infestation in flour stored in paper bags for 9 to 12 months—even though the bags were exposed to very heavy insect infestation. It also proved effective in protecting bags of animal feed against insects.

Pyrethrum-piperonyl butoxide treatment of food packages has been accepted by the U. S. Food and Drug Administration when used on the outside layer of multiwalled paper bags.

Several other chemicals—methoxychlor, lindane, and synergized allethrin—have also been found to be very promising. Research is currently underway for the evaluation of methoxychlor and lindane coatings on multiwalled bags containing flour, corn, rice, and dried citrus pulp.

In addition to treating the outer layers of the paper bag, insecticides can also be used to treat the tape, the thread, and the sleeve valve. Each of these helps in preventing insect entrance.

### Transparent Films

Many types of transparent film materials are now being used for packaging. Because of their physical properties, they make effective barriers against nonpenetrating insects. Their protection against penetrating insects, however, varies considerably.

Cellophane, for example, offers no more resistance to stored-product insects than single-ply, kraft paper. Furthermore, cellophane is very susceptible to damage by roaches.

Polyethylene, the most widely used of the plastic films, is slightly more resistant to penetration than cellophane. How resistant depends upon its thickness. Lamination to other plastic materials helps in some cases, but research tests indicate that lamination

of plastic films to kraft paper decreases rather than increases their resistance to insect penetration.

The chief advantage of the films is in their closures. They are usually heat-sealed, and this offers good protection. For this reason, plastic films are ideal as overwraps.

### Laminated Foils

Aluminum offers still better protection against stored-product insects. But again, it is not insectproof.

In laboratory tests, lesser grain borer adults and cadelle larvae have penetrated aluminum foil alone and aluminum foil laminated to plain or asphalt kraft in only a few days. Interestingly enough, they entered the laminated wrappings more quickly than they did the foil alone.

With a good seal, however, aluminum foil-paper laminates may be used to advantage as overwraps.

### Fiberboard Containers

Fiberboard itself is more resistant to insect penetration than any of the other packaging materials. But fiberboard containers usually offer very little protection against insect invasion because of their poor construction.

Fiberboard cartons have three major weak points. These are the manufacturer's joint, the cut of the flaps, and the sealing of the flaps.

Insects have little difficulty entering fiberboard boxes through either the joints or the flap closures. Joints which are held together with staples, glue, tape, or any combination of these always seem to have breaks in the seal through which insects may enter. Tapes are particularly susceptible to penetration.

Flaps present similar problems. The side cuts on the flaps are generally too deep, so that when folded there's still a small opening at each corner. Abutting flaps are too short, leaving a wide crack in the center of the package. Overflaps which close the gap, often are not properly glued.

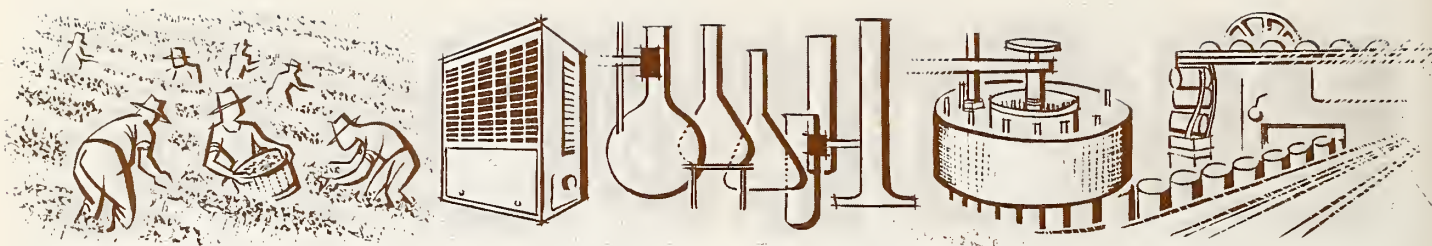
Storage tests at Savannah showed no advantage in treating boxes with insecticides if the boxes had open seams. Only those packages with all of their seams taped shut remained free of insects. Thus, a well constructed container becomes just as necessary as a good chemical treatment.

A great deal more research is required before the badly needed insect-repellent package is obtained.

As part of extensive research in development of an insect-resistant package, papers treated with hundreds of different chemicals are tested, evaluated for repellency to various kinds of insects.







# The Changing Market

## Concentration in Food Marketing

Only 2 percent of the companies engaged in food marketing in 1954 owned more than 1 establishment, but these companies employed 43 percent of the industry's workers and accounted for 52 percent of its payroll.

Most striking example of this concentration of food marketing was found in the meat industry. Multiunit companies engaged in meat packing comprised 3 percent of the total number of firms, yet they accounted for 80 percent of the industry's employment and payroll.

The situation was much the same in the processing of dairy, canned and frozen food, grain, and bakery products.

Three percent of the dairy processing companies accounted for 60 percent of that industry's employment and payroll. A similar percentage of bakery products manufacturing firms employed 62 percent of the workers and paid 66 percent of the payroll.

Multiunit companies processing canned and frozen food accounted for 6 percent of the industry, yet these firms had charge of 57 percent of the workers and 64 percent of the payroll.

Six percent of the companies processing grain mill products employed 69 percent of the workers and paid 72 percent of the labor costs.

In trade, grocery stores were the most concentrated group. About 2 percent of all companies were multiunit. These, however, represented 59 percent of employment and 67 percent of industry payroll.

While concentration in the food marketing industry is not as marked as in some nonagricultural industries, it does place a substantial amount of the Nation's food business in the hands of a small proportion of firms. Such concentration is important to farmers and consumers from the standpoint of company policy. Policies dealing with wage rates, employment conditions and practices assume added importance when they apply to large segments of industry.

## 2 Billion School Lunches

Two billion lunches were served in 1958 to about 12 million children under the National School Lunch Program.

Most of the food used in this program was purchased from local producers and suppliers. These purchases are estimated at more than \$460 million.

Funds for the lunch program, which is administered nationally by the Agricultural Marketing Service of USDA and locally by State and city educational agencies, comes from many sources.

The children themselves pay nearly \$500 million a year; State and local governments contribute another \$80 million; and other local contributors add about \$90 million more.

In 1958, USDA apportioned \$93 million for the program and made available \$50 million for the purchase of food. Surplus commodities—\$75 million worth—also are being donated to schools this year.

## Retail Cost of Farm Foods

The retail cost of the family market basket of farm foods increased 6 percent from 1957 to 1958. Farmers received 45 percent of this increase; marketing agencies, 55 percent.

Higher prices of meat and meat animals accounted for more than half of the rise in retail and farm prices. Prices of citrus fruits, potatoes, and fresh vegetables also rose sharply during the first half of the year.

Both farm prices and retail prices of food products, however, declined in the second half of 1958. In the fourth quarter, farm prices were lower than a year earlier, but retail prices were still 3 percent higher.

Marketing charges, which had risen sharply during the first 7 months, declined in August and September. Then, in the fourth quarter, they averaged 6 percent higher than a year earlier.

Most operating costs for food marketing firms were higher in 1958 than 1957. Hourly earnings of employees averaged 4 percent more. Rail freight rates on farm products also were up 4 percent, and truck carrier rates probably rose by about the same amount. Costs of most other goods and services also increased.

Yet, total profits of food marketing firms averaged more in 1958 than in 1957. Corporations manufacturing food products had slightly larger total profits in the first three quarters than in the same period of 1957. Retail chain stores also increased their profits.



# A GUIDE TO BETTER STORAGE OF FRESH GRAPES

TO GET top quality grapes out of storage, you first have to put in top quality grapes. Then, during the storage period, conditions must be kept exactly right.

Unlike most other fruits, grapes do not ripen after they are picked. Neither flavor, color, nor texture will improve after harvest.

It is thus the job of the cold storage operator to retain as much of the harvest quality of the grapes as possible. This is not always easy. A lot of variables, such as temperature, humidity, air movement, storage design, and fumigation, affect the condition of stored grapes.

As a guide to better commercial storage of fresh grapes, A. Lloyd Ryall, horticulturist, and John M. Harvey, plant pathologist, in the Marketing Research Division of AMS are preparing a handbook on "The Cold Storage of Vinifera Table Grapes."

This manual will present the accumulated knowledge of 30 years' research and experience in grape storage. It will provide operators of storage plants, growers, packers, and buyers of fresh grapes with a wealth of information on how to maintain the quality, reduce the spoilage, and improve the marketing of their product.

According to the handbook, mature fruit is the first requisite for successful storage. Properly matured grapes are the least likely to shatter, discolor, or mold.

Precooling should immediately follow harvesting without unnecessary delays in the vineyards and the packing houses. The temperature in the cooling room should be kept just above freezing and the method of pre-

cooling such that the cold air circulates freely through the fruit.

Precooling rooms, especially constructed for this purpose, offer the best accommodations. These rooms have more refrigerating capacity and greater air volume than regular storage facilities.

In some modern storages, grapes are cooled in tunnels through which the fruit passes on a continuous conveyor with cool air blowing over the berries. By the time the grapes reach the end of the tunnel, a large part of the field heat has been removed.

From the precooling room or tunnel, the grapes move directly into regular storage. Here, they are ideally kept at a temperature between 30° and 31° F. Humidity should be controlled at 87 to 92 percent. In contrast to precooling, only enough air movement is provided to remove vital heat and heat leaking into the room.

During storage, grapes are subject to many different kinds of injuries and diseases. One of the most important of these is gray mold rot. This is caused by a fungus that grows at low temperatures. It is found particularly in the Emperor, Ribier, and Flame Tokay varieties when they are harvested late in the season after exposure to high moisture conditions.

There are three ways to reduce gray mold rot, each of which supplements the other.

1. Hold the grapes at low temperatures.
2. Fumigate with sulfur dioxide during storage.
3. Spray or dust with a fungicide in the field (captan is recommended).

Cladosporium rot is another type of disease that causes spoilage of grapes held in cold storage. Losses from this disease can be held down by sulfur dioxide fumigation.

There are, in addition, several other types of rot as well as other types of injuries that can and do affect the quality of stored table grapes.

In plants that use ammonia gas in their refrigeration systems, there's always a chance some of the gas might escape into the storage room. If this

happens, the leak should be located and sealed immediately, and the room cleared of gas as soon as possible. The storage area should then be given a sulfur dioxide fumigation to neutralize any ammonia residues.

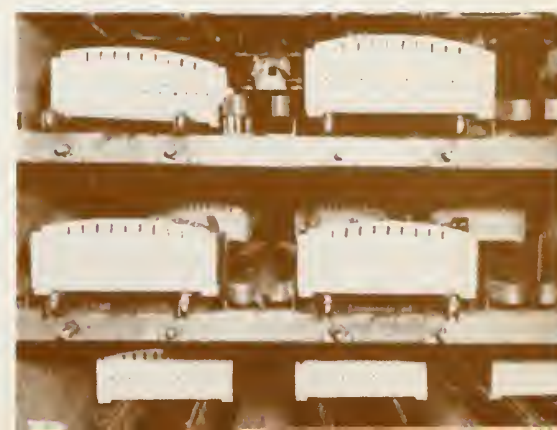
Quick action is imperative because, if the exposure to ammonia is prolonged, the fruit will not recover.

Another common problem results from bruised fruit moving into the storage facility. Grapes separated from the cluster are a loss when the clusters are sold at retail. So are attached grapes that become damaged in the packing case. More careful handling before storage will reduce the first problem. Protective liners which prevent the fruit from touching the sides of the lugs and padding in the bottom of the box will help with the second.

For more orderly marketing, the shipper should arrange and identify the different lots of stored grapes. Besides relying on his own knowledge and experience, he should frequently inspect each lot. Use of a "forecasting" technique (see *Agricultural Marketing*, August 1956) as the grapes are harvested or packed can serve as a further aid in determining how long the fruit will safely store.

The key to better grape marketing, thus, depends upon the knowledge and attention of the storage operator and the adequacy of his facilities as well as the quality of the product. The handbook on Vinifera grape storage offers the industry answers to many of its storage problems. It will be available for distribution later this year.

Precooling immediately after harvest is aid to successful storage. Multilayer tunnel such as this removes field heat as grapes pass through.





## W. A. Wunsch Elected President of NAMO

W. A. Wunsch of New Mexico is this year's president of the National Association of Marketing Officials. Meeting at Scottsdale, Arizona, the marketing officials also named James L. Youngblood, South Carolina, first vice-president; Winzer J. Petr, Kansas, second vice-president; and H. W. Poulson, California, and out-going President Frank W. Risher, Florida, members at large of the executive committee. Don E. Wilkinson, Wisconsin, was reelected secretary-treasurer.

Theme of this 39th annual gathering of NAMO was "The Changing Marketing Pattern." The meeting was split into two sections. Two days were devoted to business sessions at the Safari Hotel in Scottsdale and two days to a field trip from Phoenix to the Grand Canyon and back.

The field trip enabled marketing officials to view some of the citrus in the Salt River Valley, the bean fields and other crop lands along the way, and some of the cattle raising, timber, and mining areas of Arizona. An executive business session was held in the lodge at which the group stayed overnight at the Grand Canyon.

Dr. Harold E. Myers, Dean of the University of Arizona's College of Agriculture, told the marketing officials:

"This is a State where the annual precipitation ranges from 3 inches in one part to 30 inches in another. Slightly over 15 percent of our land is privately owned. The rest is Federally or State owned, or held in trust for the Indians."

O. D. Miller of the Miller-Johns Company, Phoenix, explained how Arizona's lettuce industry was developed by cantaloup shippers in the early 1920's. He described the growth of the industry and its recent changing marketing pattern.

F. R. Wilcox, general manager of Sunkist Growers, Inc., Los Angeles, admonished the marketing officials to remember that agricultural industries in the United States are built not only on the domestic market but, in part, on the export market.

"For instance," Mr. Wilcox illustrated, "7,000 of 36,000 cars of 1958 lemons are going into export."

Dr. Raymond E. Steltzer, Arizona agricultural economist, addressed the group on "Vertical Integration." A panel composed of Lloyd Van Patten, Iowa; J. D. Kaffenberger, Arizona; John Styles, West Virginia; and J. H. Meak, Virginia, pursued the topic.

W. J. Petr, Kansas, discussed the relative merits of Federal and State marketing orders, with the assistance of Fay Gaylord, Indiana; George Chick, Maine; Harold Poulson, California; and August Grunow, manager of the California-Arizona Grapefruit Committee.

Paul T. Howell, Oregon, reported on marketing promotion activities. A panel comprised of Spencer Duncan, New York; Warren Oley, New Jersey; John Rainey, Pennsylvania; and Ben Storrs, Connecticut, discussed promotional activities within their States.

Howard Pyle, former Deputy Assistant to President Eisenhower, dis-

cussed the national economic situation at the annual banquet.

Principal speakers in succeeding sessions were Don E. Wilkinson, Wisconsin, NAMO secretary; Fred W. Read, general manager, California Fruit Exchange; Oris V. Wells, Agricultural Marketing Service administrator; Seth T. Shaw, Washington, D.C., Safeway Stores, Inc., vice president; and William C. Crow, USDA Liaison Officer for the matching fund program.

Said Mr. Wells: "There is not a single overall 'agricultural problem' but rather a whole series of agricultural problems, some large, some small, some capable of fairly easy solution, and some we are likely to live with for years ahead.

"Increased attention to marketing is well worth while. Agricultural marketing is essential not only as a means of seeing the job is done as efficiently as possible but also as a means of assuring that the demand for farm products is maintained."

Mr. Read discussed cooperative marketing, and Mr. Shaw's topic was "Modern Needs in Retail Marketing." Mr. Crow outlined progress made in developing marketing service programs. Mr. Wilkinson reported to the marketing officials on the annual meeting of the National Association of State Departments of Agriculture.

Fay Gaylord, Indiana; Warren Oley, New Jersey; and Ben Storrs, Connecticut, were honored for their years of service in a recognition ceremony that highlighted the final hotel session.